

## Adapting RNAseq sample preparation for ISS

Completed Technology Project (2016 - 2017)



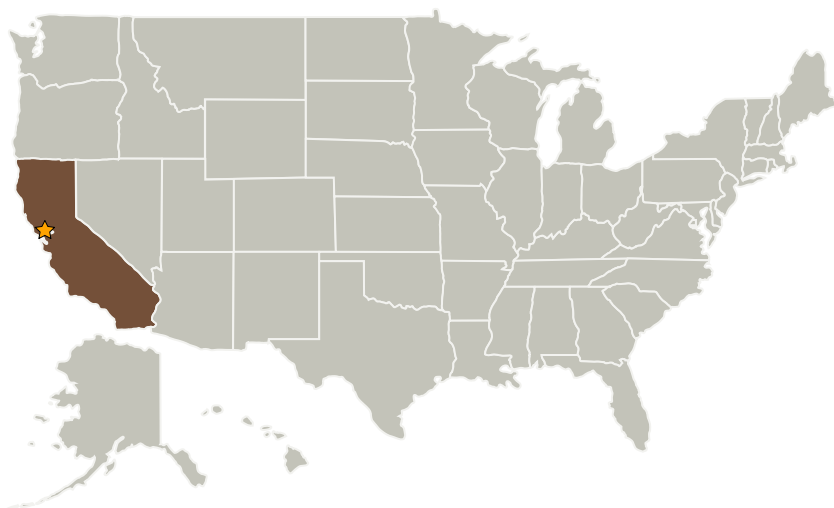
## Project Introduction

The primary innovation for this CIF will be the ability to accomplish library preparation of isolated RNA that will enable transcriptional (RNA instead of DNA) sequencing on ISS. Along with optimization of the existing RNA extraction protocols, this will enable on-station whole transcriptomic analysis of an organism via RNAseq library prep. The transcriptional sequencing steps can be summarized as follows: 1) RNA Extraction (isolation); 2) RNA conversion to cDNA and amplification of the cDNA (Pre-Amp); 3) Sequencing library preparation (providing genetic molecules of a maximum length of 5,000-8,000 base pairs (bp) and attaching ligation enzymes to the ends of the strands); 4) Sequencing run on the MinION

## Anticipated Benefits

The NRC Decadal Survey on Biological and Physical Sciences in Space has identified the need for in-situ "microanalytical technologies—...reporter-based polymerase chain reaction, high-throughput sequencing" as a critical enabling technology for mammalian, microbial and plant research advances. Currently the ISS is an exposure facility where biological samples are brought to the ISS, but returned to the ground for analysis. Analysis capabilities are needed which can be utilized in the microgravity environment to use ISS as the National Lab it is intended for

## Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★ Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Claremont BioSolutions, Inc.	Supporting Organization	Industry	

## Primary U.S. Work Locations

California

## Project Transitions

▶ **October 2016:** Project Start

✓ **July 2017:** Closed out

**Closeout Summary:** We established the feasibility of using RNA extracted from the WetLab-2 system and simplified the needed steps, enabling transcriptional sequencing on ISS. Future work would involve further simplifying the needed steps and validating the technology on ISS.

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Ames Research Center (ARC)

**Responsible Program:**

Center Innovation Fund: ARC CIF

## Project Management

**Program Director:**

Michael R Lapointe

**Program Manager:**

Harry Partridge

**Principal Investigator:**

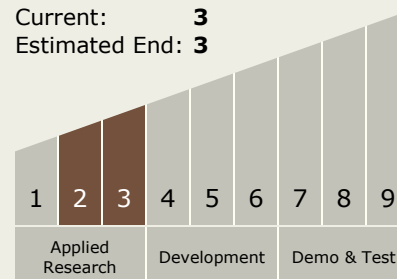
Macarena P Parra

## Technology Maturity (TRL)

Start: 2

Current: 3

Estimated End: 3



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## Technology Areas

### Primary:

- TX08 Sensors and Instruments
  - └ TX08.3 In-Situ Instruments and Sensors
    - └ TX08.3.3 Sample Handling

## Target Destination

Earth

## Supported Mission Type

Planned Mission (Pull)